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THE ADDRESS IN SURGERY.

The Present Status of Abdominal Surgery.

*Delivered at the Thirty-Seventh Annual Meeting of
the American Medical Association on
Tuesday, May 5, 1886.*

BY N. SENN, M.D.,

OF MILWAUKEE, WIS.

CHAIRMAN OF THE SURGICAL SECTION OF THE AMERICAN MEDICAL
ASSOCIATION, FOR 1886.

ATTENDING SURGEON TO THE MILWAUKEE HOSPITAL; PROFESSOR OF THE
PRINCIPLES AND PRACTICE OF SURGERY AND CLINICAL SURGERY IN
THE COLLEGE OF PHYSICIANS AND SURGEONS, CHICAGO, ILL.

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THE PRESENT STATUS OF ABDOMINAL SURGERY.

The frequency with which grave complications followed even the most trivial operations before the introduction of the modern treatment of wounds, undoubtedly induced the great Hunter to remark: "The necessity for operation is in truth the defect of surgery." To-day, with an improved technique and the means at our disposal which, if properly applied, will furnish almost absolute protection against wound infective diseases, the surgeon can, with a just source of pride and gratification, confirm the correctness of the assertion made centuries ago by Celsus, "*quæ manu potissimum curat.*"

No one who is familiar with the medical literature of the last two decades can arrive at any other conclusion than that the legitimate sphere of the physician has been gradually growing smaller, or, if this statement be objected to, that the practice of medicine has become more and more surgical. In accordance with the spirit of the times, uncertainty and doubt in the diagnosis and treatment of disease must give way to positive knowledge and actual demonstration. Surgery has gained the supremacy over medicine because the principles upon which modern surgery rests have been made the subject of accurate investigation and positive demonstration in the chemical, physiological and pathological laboratories.

The science of surgery is rapidly assuming a degree of accuracy approaching in perfection any of the exact sciences. During the last few years surgery has assumed a decidedly progressive and aggressive character. Operations which a few years ago would have been deemed impossible or unjustifiable, have become established, legitimate surgical

procedures. In obscure doubtful cases the scalpel is now frequently resorted to, without fear of causing additional complications, for the purpose of making *intra vitam* an anatomical diagnosis. Modern surgery has achieved its greatest triumphs in enlarging the field for the direct local treatment of disease, thus enabling the surgeon to treat with success injuries and lesions beyond the reach of medicinal agents. The surgical literature of the day bears abundant evidence that the remotest organs are now approached by the surgeon with comparative immunity, and that incalculable benefit has been derived from direct operative treatment. The affections of abdominal organs have received the well-merited attention of surgeons since the improved wound treatment has been introduced. Numerous maladies which heretofore have been considered incurable are now successfully treated by the surgeon by operative measures. Experimental research and clinical experience have demonstrated that organs and parts of organs which were heretofore regarded as indispensable and essential, can be successfully extirpated when they are the seat of injury or disease. With a view of directing your attention to a few of the most brilliant achievements of modern surgery, I have selected as the subject of my address, "The Present Status of Abdominal Surgery." A condensed brief account of the more recent advances made in the surgical treatment of injuries and diseases of the abdominal organs must interest equally the physician and the surgeon.

It is not my intention to trespass upon the legitimate field occupied by the ovariologist or the gynecologist. I shall therefore limit my remarks to a consideration of such injuries and lesions of the abdominal organs as they present themselves to the physician and general surgeon. It will be my special aim to point out the limitation of abdominal operations, and to draw a distinct line between the feasibility and justifiability of such operations.

I. *Penetrating Wounds of the Abdomen.*—During the last year the literature on this subject has been enriched by two valuable papers by Drs. Dennis and Bryant, of New York. These contributions, made in such rapid succession, may be considered as sufficient evidence of the deep interest which has been awakened among American surgeons on this practical and important subject.

Dennis has well said, "It is a source of National pride that laparotomy in penetrating wounds and visceral injuries of the abdomen was conceived, developed and perfected in America."

The propriety of resorting to abdominal section in every case of penetrating wound of the abdomen is urged by many, but it cannot be said that this practice is sanctioned by the majority of the profession at the present time. The great difficulty that presents itself to the surgeon in the absence of positive symptoms, is to differentiate between a penetrating and a visceral wound. Clinical experience and statistics have demonstrated the importance of making a distinction between punctured wounds and gunshot wounds of the abdomen both in reference to diagnosis and treatment. It is well known that penetrating stab wounds are less likely to be complicated by visceral injury than bullet wounds, consequently this class of injuries offers a more favorable prognosis and does not call so uniformly for treatment by abdominal section. As in stab wounds, there is a greater tendency to prolapse of the intestine, exploratory laparotomy for diagnostic purposes is also less frequently called for. The numberless recoveries after stab wounds of the abdomen, without resorting to heroic treatment, must induce every thoughtful surgeon to abstain from subjecting the patient to the additional risks of laparotomy, unless the symptoms are such that the existence of visceral injury can be assumed with a reasonable degree of certainty. It must, however, be remembered in arriving at conclusions con-

cerning the nature of the injury, that the symptoms do not always correspond to the gravity of the visceral lesion, hence if any doubt remains in the mind of the surgeon, it is justifiable and proper, now that exploratory laparotomy can be made with such comparative immunity, to resort to it and give the patient the only chance of recovery by ascertaining the exact nature of the injury, which can be the only proper and safe guide to rational and successful surgical treatment. Dr. Dennis has called special attention to volvulus as another complication of stab wounds of the abdomen, a condition which, when present, would in itself always indicate an abdominal section for its relief. In doubtful cases exploratory laparotomy can be done by enlarging the wound, which, when required, can be followed by the usual incision in the median line when operative treatment of the visceral lesion is required.

In gunshot wounds of the abdomen the course of treatment to be pursued is more definitely settled by accumulated knowledge resulting from careful experimental research and an immense clinical material. These injuries are so uniformly fatal that the slightest suspicion of injury of the intestine calls for treatment by laparotomy as affording the only chance of recovery for the patient. The statement by Otis that gunshot injuries of the small intestines are always fatal if treated upon conservative principles, is practically well established, and is a sufficient argument in favor of treatment by abdominal section. In penetrating gunshot wounds it is highly probable that visceral injury exists, and this fact constitutes a potent argument in favor of surgical interference, which alone is adequate to prevent an inevitable fatal termination. The brilliant results which have been obtained by Bull, Hamilton, and others in desperate cases of multiple perforations of intestines, by operative treatment, afford abundant encouragement for imitation of their practice.

It can be justly said that the surgeon who allows a patient to die from the effect of a visceral injury of the abdomen produced by a stab wound or a bullet wound, without at least a proposition to resort to abdominal section, has failed to discharge the duties imposed by the teachings of modern surgery. Difficulties may be encountered by the medico-legal bearing of a case, but when called upon to treat an otherwise fatal injury, this should not deter the surgeon to resort to the only measure which might save a human life. The first indication that presents itself in the treatment of an open wound of the peritoneal cavity is to prevent infection by covering the wound with an antiseptic compress, until ample preparations can be made for more effective treatment. Whenever practical, the necessary dressing or operation should be done with the least possible delay and at or as near as possible the place where the injury was inflicted. Procrastination and transportation are dangerous factors in the treatment of this class of injuries, as both augment the gravity of the case by increasing the danger arising from the two most dangerous conditions—hæmorrhage and fæcal extravasation.

The preparation for an abdominal section should be made with the same care as in opening the abdomen for the removal of an ovarian tumor. If the operation has to be performed we can never rely on an aseptic atmosphere, hence the minutest details of antiseptic surgery must be followed. The wound and especially the prolapsed viscera must be kept protected as much as possible against the air by avoiding unnecessary exposure.

As a disinfectant solution corrosive sublimate should be preferred to carbolic acid. The temperature of the room should be kept at 80–90° F. Until the abdominal cavity is opened the field of operation must be frequently irrigated. The intestines when brought out of the wound should be carefully protected with a warm aseptic compress kept moist with a weak so-

lution of corrosive sublimate with a view of preventing abstraction of heat and guarding against infection.

The abdominal section has for its object: 1. Positive diagnosis. 2. Arrest of hæmorrhage. 3. Restoration of a breach of continuity. 4. Removal of extravasation. Exploration of a penetrating wound either with the finger or a probe is never justifiable as it increases the danger from extravasation and hæmorrhage without furnishing any information of a diagnostic value. The direction of the wound canal and the anatomical location of the different viscera must be carefully considered before resorting to operative measures.

When it becomes necessary to make an exploratory incision of sufficient size to enable the operator to introduce his hand it is preferable to select the median line, as an incision at this point inflicts less additional traumatism, is attended by little or no hæmorrhage, and can be utilized at once for the necessary operative treatment of the visceral lesions, if they exist. It is a source of comfort to the surgeon to know that the different operators experienced but little difficulty in detecting the seat of lesion in the bowel, and that usually all the perforations were found in multiple wounds of the intestines. It is unnecessary to urge upon you the importance of a careful search for additional injury when one perforation is found, as a failure to detect all of the openings in the intestine would frustrate the object for which the patient was subjected to such a grave procedure.

Great stress has been placed upon the importance of carefully arresting all hæmorrhage. From the peculiar anatomical relations of the blood-vessels in the abdominal cavity it has been found that even very small vessels will continue to bleed unless permanent hæmostatic measures are employed. If many bleeding points are encountered a number of hæmostatic forceps can be applied before tying the vessels. If any of the large venous trunks have been injured,

compression of the aorta with or without peripheral venous compression will facilitate the difficult task of securing the bleeding vessel. If the wound in the bowel can be approximated without producing too much narrowing of its lumen it should be closed with a Lembert's or a Czerny-Lembert's suture.

If enterectomy becomes necessary the two ends of the bowel should always be united with a Czerny-Lembert's suture, as this suture secures accurate approximation of an extensive serous surface, and thus furnishes the most favorable condition for rapid union which affords the best possible protection against the danger of subsequent extravasation. If fecal extravasation has taken place it becomes necessary to resort to a careful toilet of the peritoneum, which can be accomplished most efficiently with large flat aseptic sponges wrung out in a weak solution of sublimate. When extensive soiling of the peritoneal cavity has taken place it would appear most expedient to resort to thorough irrigation with warm sterilized water, with a view of effecting mechanical removal of all foreign substances. When this has been accomplished the peritoneal cavity should be further cleansed and dried with a sponge wrung out of a $\frac{1}{20}$ per cent. solution of corrosive sublimate. The abdominal incision is closed in the same manner as after abdominal section for other purposes, in all cases where we have reasonable cause to believe that we have succeeded in securing an aseptic condition of the peritoneal cavity; if any doubt remains upon this point, drainage is indicated.

The subsequent treatment must be conducted on general principles, rest, absolute diet, and the administration of opium being the most essential conditions in favoring rapid healing of the the intestinal wound. In the future shock will not be mentioned as frequently as heretofore as a cause of death in penetrating wounds of the abdomen, as it has only too frequently been mistaken for the symptoms due to

acute anæmic from hæmorrhage into the peritoneal cavity. Further, when life is threatened from this cause, a fatal termination can often be prevented by resorting promptly to transfusion of blood, or infusion of a saline solution, after the bleeding points have been secured. I am satisfied that no modern surgeon would hesitate to endorse the treatment of visceral wounds of the intestines by abdominal section; the opposition to the operation can only be entertained in cases where it is impossible without an exploratory incision to differentiate between a penetrating wound and a visceral wound.

It is to be regretted that in perforating wounds of the intestines symptoms are often deceptive, and cannot always be relied upon as an unerring guide in diagnosis. Grave symptoms may be almost entirely absent, and yet many perforations exist, while in other instances severe symptoms may be present without visceral injury. Until we shall be able to make a differential diagnosis by the simple interpretation of symptoms, we must insist upon the justifiability of explorative laparotomy for diagnostic purposes in all doubtful cases, and upon the importance of treating all visceral wounds of the intestines by abdominal section, as affording the only chance of preventing an otherwise almost certain fatal termination.

II. *Laparo-Colotomy*.—In cases of rectal cancer not amenable to extirpation, Madelung advises that the colon should be divided completely across low down, and the peripheral end should be permanently closed by inverting the margins deeply and applying two rows of sutures. A preternatural anus is established by stitching the proximal end to the margins of the wound in the same manner as in forming an intestinal fistula in any other locality. The advantages of this operation over the ordinary method are twofold: 1. The disease in the lower end of the bowel is not aggravated by the coming in contact

with the intestinal contents. 2. No fecal accumulation takes place below the artificial opening as is so often the case after the ordinary methods of colotomy. Pollsson and Letievant advise the same operation.

III. *Subcutaneous Laceration of Intestines*.—One of the darkest chapters in abdominal surgery pertains to subcutaneous traumatic rupture of the intestines. That this accident occurs more frequently than has been generally supposed is well substantiated by recent investigations, and as the majority of cases have proved fatal on the expectant treatment, it is proper and important to consider the propriety of abdominal section in all cases where we have reason to suspect its existence.

Muguier has called attention to the fact that in some instances, the laceration may be incomplete and give rise to no serious symptoms for days or weeks, until perforation takes place. A contusion of the abdomen is received and the patient and surgeon are in the belief that no serious injury has been sustained until symptoms indicative of perforation, and faecal extravasation announce the gravity of the primary lesion. He reports three cases of this kind which came under his own observation, only one of which terminated favorably, and in this case the perforation produced a suppurative perityphlitis. He cites four additional cases, of which two terminated in recovery after the formation of a faecal abscess. These cases should at least put us upon our guard to exercise proper care in the treatment of abdominal contusions, so as to prevent, if possible, the disastrous consequences incident to perforation. Regulation of diet, rest, and the use of opiates may do a great deal towards the restoration of a partial loss of continuity of the injured bowel.

Chavasse observed two cases of laceration of the intestine from contusion of the abdomen which induced him to compile all cases of rupture of the intestines due to the same cause. He found a record

of 149 such cases. A careful study of this material led him to the conclusion, that in almost every case laceration or crushing of the intestine takes place at a point between the place where the external violence is applied and the unyielding resistance offered by the posterior abdominal wall. Of these cases only six recovered, while the remaining number usually died within twenty-four hours with symptoms of perforative peritonitis. He is in favor of treatment by abdominal section, with a view of suturing the torn intestine or making an artificial annus.

Berger insists that laparotomy should be performed in all cases where a diagnosis of intestinal rupture can be made. In the differential diagnosis injury to the kidney becomes apparent from the character of the urine. Injury to the gall-bladder can be excluded if the patient throws up large quantities of bile. The direction and amount of force which produced the injury as well as the extent of surface which was exposed to the violence, must also enter into consideration in determining the location and extent of the visceral injury. In contra-distinction to injury of the liver and spleen, rupture of the intestine must be suspected in case the force is applied over the median line, anteriorly, forcing the intestines directly against the spinal column. Berger and Verneuil speak against primary resection and suturing of the bowel in these cases, and advise the formation of an artificial anus. The great difficulty which presents itself to the surgeon is the absence of positive diagnostic symptoms.

In a recent paper on this subject Dr. Weir enumerates as the most prominent symptoms: collapse, rapid respiration, frequent wiry pulse, vomiting, thoracic respiration, emphysema, and absence of hepatic dulness. The last symptom, when present is one of the most certain signs indicative of the existence of perforation, but it is also necessarily absent in all cases where the liver has become fixed and immovable by inflammatory adhesions prior to the ac-

cident. Emphysema and collapse are the two most constant and reliable symptoms upon which to base a probable diagnosis soon after the accident has occurred. Extensive extravasation usually does not take place, as the experiments of Jobert upon dogs have shown, that if the intestine is completely divided, the ends may contract by their circular fibres, and thus prevent escape of the intestinal contents. Of all the cases so far reported, the rupture was found almost uniformly in the small intestines and in preference in the first portion of the tract, the duodenum and the jejunum, an important hint in searching for the seat of laceration on making abdominal section. The shock attendant upon this accident is more apparent than real, and is in no ratio to the gravity of the injury. It must also be remembered that hæmorrhage is an important element of danger, and, when considerable, it may simulate the existence of shock. So far the only case on record where laparotomy was performed for traumatic laceration of intestines is reported by Mr. Owens, of London, who found the laceration, sutured and returned the bowel. Unfortunately the patient died. Duplay affirms that the rupture, as a rule, is complete, and as such an accident must be uniformly fatal, abdominal section affords the only chance for the recovery of the patient and should always be resorted to whenever the history of the case and the symptoms presented indicate the presence of this lesion. As the intestinal coats have undergone no pathological alterations, typical circular resection and suturing of the bowel should be practised in preference to the advice given by Chavasse, Berger, and Verneuil of establishing an intestinal fistula.

IV. *Intestinal Obstruction*.—The treatment of intestinal obstruction by abdominal section is still in its infancy, but in view of the almost hopeless condition of patients suffering from obstruction due to permanent organic changes, the results which have been

obtained by operative procedures should stimulate us to abandon the expectant treatment for more positive measures. Schramm has collected 190 cases of intestinal strangulation treated by laparotomy, including three cases observed by himself in the practice of Mikulicz. He alludes to the difficulties encountered in the diagnosis of these cases and pleads in favor of early operative interference. Of this number 64.2 per cent. died, the mortality before the antiseptic treatment of wounds being 73 per cent., and since that time 58 per cent. The cause of strangulation and mortality attending each kind may be gleaned from the following table:

27	times,	Invagination,	8	cured,	19	died.
49	"	Bands or intestinal diverticulum,	13	"	36	"
16	"	Adhesions,	7	"	9	"
11	"	Reduction <i>en masse</i> ,	6	"	5	"
10	"	Torsions,	1	"	9	"
12	"	Knotting of bowel,	4	"	8	"
12	"	Internal strangulation,	4	"	8	"
7	"	Foreign bodies,	4	"	3	"
38	"	Neoplasms,	16	"	22	"
8	"	Unknown causes,	5	"	3	"

The results of operations for internal strangulation will improve as soon as the physician will recognize the inefficiency of the expectant plan of treatment and will resort to timely operative measures, before the strength of the patient has been exhausted, or the cause of strangulation has led to extensive secondary pathological changes in the tissues about the seat of strangulation. Recently Kussmaul has introduced irrigation of the stomach as a means of treating intestinal obstruction. While this measure does not exert any positive curative effect upon the cause of obstruction, it serves as an efficient palliative by diminishing hydrostatic pressure and subduing increased peristaltic action, conditions which necessarily aggravate the symptoms due to obstruction.

a. Intussusception.—Until recently the operative treatment of invagination has been considered by the

majority of the profession almost in the light of a criminal procedure. At present the indications are that most surgeons would resort to it in all cases where severe symptoms are present which would indicate the existence of acute or chronic obstruction from this cause and not remediable by medical treatment or local measures. In cases where no adhesions have taken place between the *intussusceptum* and the *intussusciens*, reposition can frequently be effected by the administration of an anæsthetic for the purpose of relieving abdominal tension, manual or instrumental attempts at reduction, inversion of the patient, forcible rectal injection of water, and massage over the invaginated bowel. The injection should be made slowly and uninterruptedly until resistance is overcome, but also with sufficient care to prevent rupture of the bowel.

If these measures fail to effect a reduction no time should be lost in resorting to abdominal section with a view to facilitate disinvagination by direct manipulation. If by traction, direct compression, dilatation of neck of *intussusciens*, separation of adhesions, etc., reduction is not accomplished, circular resection of the invaginated bowel, or the formation of an artificial anus above the invagination present themselves as the only means to save life within the range of operative surgery. The formation of a preternatural anus is preferable in cases where a large portion of the bowel has become invaginated, and again where the general condition of the patient is so grave that the more severe operation of enterectomy is contraindicated. In fifty-one cases where laparotomy was done, reduction was successful in twenty-six—eighteen children with four recoveries, and eight adults with five recoveries. So far no child less than six months old has recovered after operation. In the twenty-five cases where reduction failed to be accomplished or where no attempt was made, in four the abdomen was closed without any further attempt

being made; in all of them the result was fatal. Of eleven cases of resection only one recovered, and this was Czerny's case where the disinvaginated bowel was resected on account of malignant disease. In nine cases enterotomy was performed, as reduction was found impossible, and circular resection was deemed impracticable; in all, except one, death occurred a few hours after the operation. In the latter case life was prolonged for two and one-half days, the patient being an adult female.

So far success has attended abdominal section for invagination in cases where disinvagination by direct manipulation was accomplished, an experience which argues strongly in favor of an early operation before reduction is rendered impossible by additional pathological conditions. It may be stated as a rule that temporizing measures should not be relied upon for more than two days.

In the case of adults when chronic symptoms of obstruction precede an acute attack, the invagination is often due to the presence of a tumor upon the inner surface of the intestine, a condition so well illustrated by Czerny's cases reported by Fleiner. The first patient was 45 years of age where an adenocarcinoma of the ileo-caecal valve produced invagination of the lower portion of the ileum into the colon. The stenosis was partial and chronic, but when invagination occurred the symptoms of obstruction became sufficiently urgent to justify a resort to laparotomy, which was performed in the median line. The seat of obstruction was readily found and the invagination was corrected, but the patient died on the following day of peritonitis.

In the second case, a man 52 years of age, the symptoms of obstruction appeared suddenly. He recovered partially from this attack and came under Czerny's care six weeks after the acute attack. A tumor, freely movable, was found close under the right costal arch. The diagnosis was narrowed down

to either a floating kidney with symptoms of strangulation or intussusception produced by a tumor of the intestine, with the probability in favor of the latter. Abdominal section revealed the correctness of the latter supposition. The ileum had slipped into the colon and had ascended as high as the right flexure of the colon. The invagination was reduced without difficulty. At the apex of the invaginated portion a carcinomatous tumor was found. The growth was excised with a broad healthy strip of the intestinal wall, and the wound sutured. The patient was discharged on the twenty-eighth day, and presented himself four months later in excellent health. That the prognosis would be more favorable if the invagination is caused by a benign tumor of the intestinal wall is apparent. If in such cases disinvagination is possible an incision into the bowel will enable the surgeon to remove the tumor either without or only with partial resection of the intestine, and the operation is finished by closing the wound with a Lember's or Czerny-Lember's suture.

b. Enterolithiasis.—The subject of intestinal obstruction by an enterolith has been prominently brought to the attention of the profession by two cases reported during the last year by Dr. Lange and Dr. Beam. Dr. Lange's patient was a woman 60 years of age who had for a year suffered at times from colicky pains which were attributed at the time to the passage of gall-stones. She was suddenly attacked with symptoms of acute intestinal obstruction, and when visited by the doctor four days later she was in a condition of collapse. As an operation offered the only possible chance of recovery median laparotomy was performed. On opening the peritoneal cavity a considerable quantity of turbid flocculent serum escaped, and after the omentum had been lifted the small intestine presented itself, moderately distended and matted together by recent adhesions. Tracing the distended bowel, in a few seconds a hard

lump was felt in the interior of the intestine, below which the bowel was entirely collapsed. It was evident that the obstruction was caused by this foreign body, which was removed through a longitudinal incision in the bowel. The intestinal wound was closed with a double row of sutures and the abdominal incision united in the usual way. The patient died eight hours after the operation. The mass removed was sufficiently large to occupy the entire lumen of the intestine, and on section showed in its centre a crystalline round nucleus of cholesterin, about the size of a small walnut, around which, in concentric layers, was a brownish crust varying in thickness from one-fourth to one-half centimetre. The concretion had undoubtedly formed during the passage of the gall-stone.

An enterolith of similar size and structure has been recently shown me by Dr. Ira Manley, of Markesan, Wisconsin, which he removed post-mortem from the lower portion of the small intestine in a woman who had suffered a long time from intestinal obstruction which finally proved fatal.

In Dr. Beam's case the enterolith had become arrested in the ileum just above the ileo-cæcal valve, where it gave rise to acute obstruction. Laparo-enterotomy was performed and the patient recovered. The foreign body was as large as an English walnut and contained a nucleus as large as a buckshot.

As in most specimens heretofore examined the nucleus of the enterolith was composed of a gall-stone, the previous history of gall-stones should be remembered in considering the nature of the cause of the obstruction, and when a probable diagnosis can be made an operation should not be delayed, as the foreign body may also give rise to perforation.

c. Entero-stenosis.—Non-malignant cicatricial stenosis of the intestine as a cause of intestinal obstruction, if circumscribed and not multiple, offers one of the most favorable conditions for operative interfer-

ence. In cases of this kind the intestine on the proximal side of the stricture will be found enormously dilated, and this condition will greatly facilitate the detection of the seat of obstruction. Typical circular resection should be performed, as it is the only measure which promises a permanent recovery. Intestinal stenosis due to malignant disease calls for enterectomy or enterotomy according to the extent of the disease, the condition of the adjacent organs, and the general condition of the patient.

d. Internal Strangulation.—The remaining causes of obstruction, included under the common term "internal strangulation," comprising volvulus, torsion, internal hernia, and strangulation by bands of cicatricial tissue, are the cases which have yielded such a large mortality after abdominal section simply because the operation was delayed for too long a time. These cases, when treated by timely interference, ought to furnish the most favorable conditions for abdominal section, as many post-mortem examinations have shown that a slight interference might have saved the patients' lives. The existence of intestinal obstruction, acute and chronic, is characterized by a familiar complexus of symptoms, so that the condition is readily recognized, but the location of the obstruction is frequently surrounded by many difficulties. As pain is not always referred to the seat of obstruction, it constitutes an unimportant symptom in localizing the lesion. Meteorism begins on the proximal side of the obstruction, consequently when the obstruction is located below the sigmoid flexure it is first observed over the descending colon; when in the transverse colon, over the ascending colon; and when in the small intestines, over the umbilical region. Vomiting of intestinal contents will take place early if the obstruction is located high up, if low down it is a late symptom. True stercoraceous vomiting indicates that the obstruction is located somewhere in the large intestines. Careful

palpation of the abdomen and in doubtful cases manual rectal exploration will constitute important aids in determining the location and nature of the obstructing cause. Peritonitis is no contraindication to abdominal section, but the operation should be done, if possible, before this complication appears. If after a most thorough and careful examination we are unable to ascertain the seat of the obstruction, the abdomen should be opened in the median line for manual exploration. A dilated intestine would indicate that the cause of the obstruction is lower down, while a collapsed condition of the bowel can only be expected on the peripheral side of the obstruction. If the cause of the obstruction is not found by the usual methods of examination, a systematic search should be made by searching for the ilio cæcal region, and exploring the intestine, inch by inch, in both directions. When the patient is still in good condition, and the abdomen is sufficiently soft and yielding for making the examination, localization of the obstruction can usually be made without great difficulty. When opposite conditions are presented, when the patient is in a condition of collapse, and the abdomen tympanitic and tense, and the seat of the obstruction cannot be readily located, Nélaton's laparo-ileotomy should be performed in the right iliac region, as affording the best chance for the relief of the most urgent and dangerous symptoms. When gangrene of the bowel is found, typical circular resection should give way to the formation of a fæcal fistula, if the obstruction is situated sufficiently low down so that such a procedure would not interfere with the maintenance of nutrition should the patient recover from the operation. Roser has made the observation that after correcting a volvulus of the sigmoid flexure the torsion of the bowel is liable to return. To prevent such an accident he advises that the loop of intestine, when placed in proper position, should be stitched to the abdominal wall by passing a few sutures through the mesentery

of the bowel and the parietal peritoneum of the left abdominal wall. After disinvagination the same precaution is suggested to prevent reinvagination; the sutures in this instance must fix the lower portion of the *intussusceptum*. In conclusion it is appropriate to allude to the following concise and practical rules laid down by J. Grey Smith for treating intestinal obstruction by abdominal section:

1. Make the incision in the middle line below the umbilicus.

2. Fix upon the most dilated or the most congested part of the bowel that lies near the surface, and follow it with the finger as a guide to the seat of obstruction.

3. If this fail, draw the intestine out of the wound, carefully covering it, until increase of distension or congestion or both in one of the coils gives an indication that the stricture lies near.

4. If there be considerable distension of the intestines, evacuate their contents by incision, and suture the wound. Never consider an operation for intestinal obstruction inside the abdomen complete until the bowels are relieved from over-distension.

5. Be expeditious, for such cases suffer seriously from shock. The whole operation ought to be concluded in half an hour.

V. *Enterectomy*.—Circular resection of the intestine has been on trial for a number of years and has been performed for different pathological conditions. The results obtained thus far have shown that success depends largely upon the condition of the tissues through which the incisions are made. It may be stated as a rule that the healing process progresses most favorably when the resected ends have not undergone inflammatory changes by extension of the pathological conditions which have necessitated the operation. Thus Jaffe has collected 121 cases of enterectomy reported since 1876; of this number thirty-six were done for gangrene of the bowel, with

70 per cent. of deaths or formation of fæcal fistula, while of the remaining cases done for intestinal wounds, artificial anus, stenosis and tumors, only 44 per cent. terminated unfavorably. A study of these cases induced him to decide against the advisability of primary enterectomy for gangrene of the intestines. The same opinion is entertained by von Bergmann. The experience of Billroth also corroborates the opinion, which is now generally accepted, that primary typical enterectomy and enterorrhaphy should not be performed in cases of gangrene resulting from strangulated hernia and internal strangulation.

Of six cases of enterectomy for gangrene operated upon by Billroth only one recovered, and in this case a fæcal fistula formed, which, however, closed without further interference in three weeks. In favorable contrast with these cases were five enterectomies combined with extirpation of tumors affecting the bowel primarily or by extension; of this number three recovered. Clinical experience appears to have definitely settled the course to pursue in cases of gangrene of the bowel, viz.: to establish a preternatural anus, and, if this fails to close by more conservative means, to resort to circular resection and suturing after the intestine has been restored to its normal condition.

That resection of a large portion of the intestinal canal is not always compatible with health is well illustrated by a case reported by Baum in which he removed 137 ctm. of the small intestines in a woman 40 years of age. The patient was suffering from strangulated femoral hernia. Taxis was only partially successful. On opening the sac an offensive fluid escaped, and a portion of the omentum was removed. Peritonitis followed and a swelling formed in the abdomen above the crural ring, which broke and a fæcal fistula was established. Rapid emaciation ensued; symptoms of strangulation made a laparotomy necessary. A mass of intestines was found twisted into a bunch which could not be unravelled, and as it was sur-

rounded by an abscess it was resected and the ends of the intestine were united with sutures. Patient recovered from operation and improved for several weeks. Six months later progressive emaciation resulted in death.

At the autopsy the seat of resection could not be found, showing how completely and perfectly the intestinal wound had healed. The reporter was of the opinion that death was caused by the great shortening of the intestinal tract.

In 1881 Koeberlé resected 2.05 m. of the small intestines in a girl 22 years of age on account of multiple stenoses of the bowel. The patient made a favorable recovery. Kocher has quite recently removed by resection 160 ctm. of small intestine for gangrene in a case of strangulated hernia. The patient recovered and at the time the report was made remained in good health.

Notwithstanding the favorable results obtained by Koeberle and Kocher, Baum's case should indicate to us that there must be a limit to the extent with which resection can be practised with immunity, and that in multiple lesions of the intestines with intervening healthy portions of the bowel it would be preferable to make multiple resections rather than to include a too extensive tract of healthy intestine with the injured or diseased portions. Nearly all operators emphasize the importance of not interfering unnecessarily with the vascular supply of the bowel for fear of causing gangrene of the resected ends. Lauenstein is so strongly convinced of the importance of this precaution that he claims the portion of intestine deprived of its mesentery always becomes gangrenous; consequently in such cases he advises resection of that portion of the intestine rather than trust to the doubtful restoration of the vascular supply by collateral circulation. That it is important to interfere as little as possible with the blood-supply of the resected ends of the bowel no one will

doubt; but that in the case of the small intestines this fear has been overestimated, I am convinced. During my experiments on the pancreas last year I often detached the mesentery from the duodenum and upper portion of jejunum in dogs and cats to the extent of from two to twelve inches, and yet gangrene of the bowel occurred only in exceptional cases. The vascular supply was restored either by the denuded surface of the bowel coming in contact and forming adhesions, the detached portion of the intestine assuming the shape of a horse shoe, the open portion corresponding to the cicatrix between the denuded surfaces, or the circulation was restored by the growth of new vessels of large size along the detached portion of the bowel, thus restoring to perfection the mesenteric circulation.

The apprehension of causing gangrene by even a slight interruption of the circulation appears to be well founded in resection of the large intestine. Czerny lost two cases of resection of the colon from gangrene produced by this cause. Lauenstein has found three similar cases recorded where, during operations on the stomach, the transverse colon was detached more or less from the meso-colon. We should *a priori* expect a greater liability of gangrene to occur from a limited interruption of the circulation in operations upon the large intestines, from the larger size of the tube, the more scanty blood-supply, and more particularly from the greater difficulties encountered with in the formation of the collateral circulation.

Appended to the report of a successful case of resection of the large intestine for malignant disease, Weir gives the statistics of thirty-five cases in which excision of a cancerous intestine was resorted to, and in all cases save one (Schede's) the disease had involved the large intestine. Of this number it is to be noted that of the five cases in which the operation was done during the exhaustion attendant upon the

acute obstruction of the bowel, all died from the shock of the operation; hence this condition is considered by Schede to contra indicate the operation. Of these thirty-three cases there was a mortality of seventeen, or 51.5 per cent., only a little greater than that which results from resection of the large intestine from other causes, and which is given by Maydl at 50 per cent. Aside from the shock, ten died within forty-eight hours; in a number of cases the progress was complicated by perforative peritonitis and intestinal fistula. When the latter occurred in the course of an otherwise favorably progressing case, it, as a rule, closed later spontaneously. The perforation was due either to faulty suturing or gangrene of the margin of the wound from detachment of the meso-colon. In cases in which the disease returned it took place in three cases in less than one year, in four others between one and two years, in one case over two years, and in Gussenbauer-Martini's case the patient was free from the disease four years after the operation.

The propriety of excision of the colon for malignant disease can therefore not be questioned, the more so if it is found on exploration that the diseased tissue cannot be removed an artificial anus can be established at once with or without excision, which will at any rate remove the symptoms due to obstruction. In two of Billroth's cases, in which the cancer affected the descending colon in one instance, and the sigmoid flexure in the other, so much of the bowel was removed that the ends could not be united; an artificial anus was established, but in both instances a fatal termination followed, in one from collapse, and in the other from septic peritonitis.

VI. *Rupture of Diaphragm*.—Rupture of the diaphragm with escape of the abdominal organs into the cavity of the chest, is a rare accident, but when it does occur it is so uniformly fatal when treated on the expectant plan that in these days of heroic sur-

gery it would appear only reasonable to make an effort to save life by abdominal section, or by an opening into the chest. Either procedure would enable the surgeon to replace the dislocated organs and to close the rupture by suturing. A number of traumatic ruptures of the diaphragm, with protrusion of the abdominal organs into the cavity of the chest, have been reported where, during life, at least a probable diagnosis could be made. All of the cases reported by Butlin and Brinton occurred on the left side. The physical signs on which the diagnosis was based consisted of tympanitic resonance over the side of the chest which contained the prolapsed intestines, with diminution of vocal fremitus and respiratory sounds over an area corresponding to the displacement of the lung. In pneumothorax respiration is abdominal; in traumatic diaphragmatic hernia the respiratory movements are costal, and the abdomen is flattened; conditions which are suggestive of the escape of gas-containing intestines into the cavity of the chest. Symptoms of intestinal obstruction indicate strangulation of the protruded bowel. Guttman regards displacement of the heart, in the absence of other causes, the most reliable diagnostic symptom.

An interesting case of traumatic diaphragmatic hernia which came into Albert's Clinic has been described by von Horoch. The patient received a stab wound immediately under the left scapula. He died two days later with symptoms of asphyxia. The post mortem examination showed that the left lung and diaphragm were punctured by the knife. Through the wound in the diaphragm a portion of the stomach, which had also been opened, had escaped into the left pleural cavity. The reporter found three similar cases in literature. He suggested that, in a diaphragmatic hernia, new or old, presenting symptoms of strangulation the chest should be opened sufficiently by rib resection to permit reduction, and to

close the wound in the diaphragm in such a manner that the sutures should embrace the serous coat of the stomach. That the recognition of a diaphragmatic hernia is not always an easy task, even after opening the abdominal cavity, is illustrated by Ferran's case. This surgeon performed laparotomy on a young woman who had suffered from symptoms of intestinal obstruction for seven days. The small intestines having been turned out from the abdominal cavity, a careful examination of their whole length and of the cæcum, sigmoid flexure, and rectum was made without the discovery of any cause for the obstruction. The wound was closed and the patient rallied well and showed signs of improvement until next morning, when sudden collapse manifested itself, with speedy death. Post mortem examination showed the existence of a diaphragmatic hernia from laceration; almost the entire transverse colon had escaped into the left pleural cavity, the distended loop of the intestine displacing the heart and the left lung. In the space near the diaphragmatic ring it was noticed that the constriction of the bowel was such as to hardly admit the tip of the index finger. Upon trying to reduce the hernia the ascending gut slipped back into the abdominal cavity without offering any resistance.

The establishment of a route to the diaphragm through the chest is not practicable on account of the frequency with which pleuritic adhesions are found and the greater amount of additional traumatism as compared with abdominal section; hence the latter should be preferred for the relief of diaphragmatic hernia in all cases where a probable diagnosis can be made, and where symptoms of strangulation dictate the propriety and justifiability of the operation. If the injury is produced by a penetrating wound of the chest, the method of operation suggested by von Horoch would be applicable, and in case the symptoms pointed also to visceral injury of the

abdominal organs it should be combined with abdominal section.

VII. *The Treatment of Peritonitis by Abdominal Section and Drainage.*—The great fatality of acute diffuse peritonitis under the old or expectant method of treatment gives some support to the recently proposed treatment by incision and drainage. This now common and general surgical procedure has been already applied with great success for the relief of inflammatory lesions of all of the other serous cavities. The first record of an operation performed deliberately on account of acute peritonitis was proposed and executed by Dr. Wiltshire in 1868. About thirteen years ago Mr. Lawson Tait followed Wiltshire's example. Since that time he affirms he has never allowed a patient to die of peritonitis without opening the abdomen whenever he was permitted to perform the operation. He has performed abdominal section forty-four times on account of the presence of peritonitis and the operation has been completely successful in forty-one cases.

As peritonitis is usually only a secondary manifestation of an antecedent primary cause, it appears plain that the treatment by surgical interference will be most successful in cases where the disease has not become diffuse, and where the original cause can be removed. Cases of this kind are represented by:

1. *Perforative Peritonitis.*—In order to recognize this condition early when most amenable to surgical treatment, it is important to allude to some of the most prominent early symptoms. Observation of a number of cases of peritonitis following perforation has satisfied Ebstein that the abdominal walls usually remain tense and rigid without distension; the abdomen may be flat and even depressed. The contracted condition of the abdominal muscles remains for a variable length of time, when it is followed by distension with or without rigidity. The contraction of the muscles diminish as the paralytic symptoms

increase. Ebstein asserts that the absence of the normal liver dulness cannot be depended upon as a pathognomonic symptom of perforative peritonitis. He mentions a case of perforation of the stomach in which no gas had escaped into the peritoneal cavity to produce displacement of the liver. The liver also remains in its normal position in cases where fluid escapes into the peritoneal cavity, and where the organ has formed adhesions by previous attacks of perihepatitis. The absence of vomiting in a case of peritonitis or its sudden cessation in the beginning of an acute attack indicates, when the patient is conscious, that either perforation of the stomach has caused the peritonitis, or, that perforation of the stomach has followed the peritonitis. Vomiting is not present when perforation has taken place into the peritoneal cavity or the bursa omentalis.

A case reported by Ebstein appears to prove that vomiting again may take place in cases of perforation of the stomach as soon as the opening in the stomach has become closed by adhesions to neighboring organs. Perforation of the appendix vermiformis, bursting of a pyo-salpinx or pelvic abscess furnish familiar illustrations of perforative peritonitis, where a timely laparotomy would hold out encouraging prospects for a favorable recovery by operative treatment. Mr. Treves has also shown that nearly all abscesses about the cæcum are in reality intraperitoneal, so that in opening these abscesses the surgeon always has to deal with the peritoneal cavity. As these abscesses are generally circumscribed by adhesions, a failure to open them in time may result again in perforation of the abscess wall and secondary diffuse inflammation of the general peritoneal cavity.

Mr. Howard Marsh relates a successful case of abdominal section for suppurative peritonitis produced by the bursting of an abscess in the mesentery around old tubercular glands into the peritoneal cavity. The patient was a young man 19 years of age, who had

suffered some time with symptoms of diffuse peritonitis. The abdomen was found exceedingly tender and distended. The incision was made over the most prominent portion of the swelling on the outside of the linea semilunaris and gave exit to two or three pints of foetid pus. The distended coils of small intestines could be felt through the wound. The cavity was washed out with a weak solution of carbolic acid and drained. The patient made a slow but good recovery.

J. W. Taylor reports an interesting case of acute hydronephrosis where rupture of the cyst into the peritoneal cavity produced great collapse, and where a timely laparotomy prevented a fatal peritonitis. The patient was a girl 15 years of age, who was attacked suddenly with pain in the left lumbar region, and vomiting, followed by the appearance of a fluctuating tumor in the same side, which was at the time diagnosed as acute hydrops of the left kidney. She suddenly became collapsed, which with other grave symptoms indicated rupture of the cyst and extravasation of its contents into the peritoneal cavity. The abdomen was opened at once through the median line. The abdominal cavity was thoroughly cleansed and the remaining portions of the cyst contents were removed by puncturing with the trocar. The cyst wall was sewed to the abdominal wound, and against all expectations the patient rallied and improved. In a few days the cyst refilled, which necessitated a second incision and drainage by means of a glass drain. Urine was discharged through the wound, but the patient improved. As no calculus could be found by an exploration of the interior of the cyst, it was believed that the left ureter had become completely obliterated, which would necessitate a nephrectomy at some future time.

That even perforation of a large pelvic abscess into the peritoneal cavity may terminate in recovery by timely and well applied surgical treatment is well il-

illustrated by a case reported by Mr. Treves, in a paper read before the Royal Medico-Chirurgical Society, March 10, 1885. The patient was a female 21 years of age, who had suffered for three months from chronic pelvic peritonitis, following severe gonorrhœa. During this time a large purulent collection, containing very offensive matter, had formed near the pelvic brim. The acute symptoms were due to the bursting of the abscess and extravasation of its contents into the general peritoneal cavity. On the following day the abdomen was opened under antiseptic precautions, the patient at the time being in a very critical condition. The peritoneum and intestines showed signs of diffuse recent inflammation. The peritoneal cavity contained a quantity of semi-opaque fluid, mixed with flakes of lymph and pus. The whole peritoneal cavity was washed out with many quarts of water, and a drain introduced. The symptoms improved promptly, and the patient recovered.

These cases furnish abundant proof that in cases of perforative peritonitis, irrespective of the nature of the material which has been extravasated, our only resource which affords any encouragement whatever, is abdominal section. In cases of this kind it is important to search for the cause of the peritonitis, and to treat the conditions, if necessary, by operative measures; the toilet of the peritoneal cavity can be most effectively accomplished by copiously flushing with warm sterilized water rendered slightly alkaline by the addition of chloride of sodium. As in these cases we can never be certain that the peritoneal cavity has been rendered perfectly aseptic, it is always advisable to resort to drainage. We have every reason to hope that in the future perforation of the stomach or intestines will be treated by abdominal section, as it holds out the only possibility of preventing death from the consecutive peritonitis by removing the extravasation and preventing further escape by closing the rupture. In such instances it is essential to

search for the perforation, which must be treated in the same manner as intestinal wounds, after which the peritoneal cavity is cleansed, drained, and the wound closed.

The successful local treatment of tuberculosis has recently been extended to:

2. *Tubercular Peritonitis*.—Koenig has called attention to the difficulty met with in the diagnosis of circumscribed ascites following tuberculosis of the peritoneum, and other fluctuating tumors of the abdominal cavity. He refers particularly to the peculiar kind of fluctuation found in these cases as an almost pathognomonic evidence. The fluctuating waves are large and are conveyed from one wall to the other, and the undulations are imparted to the abdominal wall.

Von Holst reports a case of tuberculosis of the peritoneum which was remarkable from the fact that on palpation over the abdomen dulness and fluctuation were felt as distinctly as in ascites, which on post-mortem was not found to exist. The deception was due to firm adhesions which had formed between the omentum and intestines.

Not infrequently one or more smaller swellings are felt in the vicinity of the large one. Clinically it has been shown that the swelling may decrease in size for a time or that it may remain stationary for a considerable length of time. Tuberculosis of the peritoneum is most frequently found as a complication of tuberculosis of other organs, but sometimes it occurs as a primary lesion in persons without any hereditary taint.

Bucquoy observed a case which had its origin in a cheesy tubercular degeneration of the ovaries. Koenig reports four cases of abdominal section performed for tuberculosis of the peritoneum. The patients were all females. One of them remained well two years after the operation. The exudation was usually found immediately beneath the anterior

abdominal wall, the intestines, uterus and ovaries being pushed backward. The cyst wall was always found lined with a thick fibrinous wall which presented all the microscopical appearances characteristic of tuberculosis. After incision the fluid was evacuated, the sac washed out with carbolized water, and the inner surface of the cyst wall dusted with iodoform. In the case which remained well after two years the cavity was drained, and the patient left the hospital with the drainage-tube. The fistulous opening healed subsequently. Koenig is of the opinion that in some cases of primary tuberculosis of the peritoneum a radical cure can be effected by laparotomy and local treatment.

3. *Chronic Peritonitis with effusion*.—The most favorable pathological condition of the peritoneum for surgical treatment is chronic inflammation with serous effusion. Abdominal section with drainage relieves the pressure promptly, and thus favors reabsorption and the restoration of the physiological balance between secretion and absorption. Savage reports that he has performed laparotomy in six cases of subacute peritonitis attended by more or less effusion, and all of his patients recovered.

4. *Ascites*.—Dr. A. G. Caillé, of New York, has recently called the attention of the Academy of Medicine to the value of permanent drainage in ascites. He related two cases of cirrhosis of the liver with marked ascites, in which he had inserted a drainage tube into the peritoneal cavity at the linea alba, with the result of affording great relief of all the distressing and dangerous symptoms, and probably prolonging life for a considerable period. In one case an autopsy could not be secured, but in the other one was made, when it was found that there was not the slightest indication of peritonitis at the point where the fistula was made. If permanent drainage of the peritoneal cavity is possible without causing inflammation, it is obvious that the treatment of as-

cites by drastic cathartics, diuretics, and other debilitating measures should be abandoned in favor of this surgical procedure.

VIII. *Gastrotomy*.—The indications for gastrotomy have multiplied with the advances of modern aggressive surgery. The following are conditions for which the operation has been performed:

1. Extraction of foreign bodies.
2. Malignant disease of œsophagus.
3. Non-malignant stricture of œsophagus.
4. Cicatricial stenosis of pylorus.

Alsberg has collected 107 cases in which the operation was done with a view to establish a permanent gastric fistula for the following conditions: Carcinoma 72, syphilitic stricture 2, cicatricial stenosis 16. Of this number, 24 patients survived the operation for more than thirty days. Of 22 cases proving fatal soon after the operation, 12 died of diffuse peritonitis, and 3 of phlegmonous inflammation of the abdominal walls.

Gastric Fistula.—When the operation has for its object the formation of a gastric fistula, it is of some importance to know at what point the stomach can be opened most advantageously by interfering least with its functional capacity. The majority of operators have had recourse to Fenger's incision, about two inches below and parallel to the left costal arch. Sédillot recommends an incision which should correspond to a point over the middle of the anterior surface of the stomach, claiming that the subsequent traction upon the cicatricial band in this locality would be reduced to a minimum, at the same time there would be no risk of injury to any important blood-vessels. Larger argues in favor of making the fistula as near the cardiac end of the stomach as possible, and nearer the lesser than the greater curvature of the organ. Berger and Championniere assert that clinical experience and post mortem examinations have shown that the opening is usually made near the pyloric orifice of the stomach, irrespective of the

particular method of operation selected by the surgeon. They also believe that a fistula in this locality does not impair the functional result. When a gastric fistula is to be established, the operation should be done in two sittings. The preliminary operation consists in making abdominal section, stitching the parietal peritoneum to the skin, thus protecting the soft tissues against phlegmonous inflammation by contact with infectious substances, and fastening the anterior surface of the stomach with Lembert's sutures to the margin of the wound, so as to secure adhesions between the visceral and parietal peritoneum before the organ is opened. After two or three days firm adhesions have formed, when the operation is completed, by making a small incision through the wall of the stomach. Experience has shown that when the incision is large, it is difficult to prevent the escape of the contents of the stomach through the fistula even by ingenious contrivances, while a small opening is readily kept closed by a well-fitting compress.

1. *Extraction of Foreign Bodies.*—When a foreign body has become lodged in the stomach, and its presence can be ascertained by a well defined complexus of symptoms, or by physical examination, no time should be lost in removing it by gastrotomy, as the foreign body may produce death by interfering with gastric digestion or by producing perforation. Under these circumstances the operation is completed by suturing the wound in the stomach after the extraction of the foreign body, in the same manner as an intestinal wound, using the precaution to apply a double row of sutures to secure more efficient and perfect coaptation of the margins of the wound and serous surfaces. Absolute and complete physiological rest of the organ is an essential condition for obtaining primary union in the shortest space of time. Gussenbauer removed, by gastrotomy, a sword-blade 27 ctm. in length and 2 ctm. in breadth. The

patient, unfortunately died of septic peritonitis, due to a perforation of the posterior wall of the œsophagus 14 ctm. above the cardiac orifice of the stomach, and another perforation in the fundus of the stomach 1 ctm. in width. Billroth removed successfully a set of false teeth in the same manner, and the patient recovered without any untoward symptoms. That the stomach may become the receptacle of strange and most disgusting substances is well illustrated by the cases recently reported by Schœnborn and Thornton, where gastrotomy was successfully performed for the removal of large masses of hair. Both patients were hysterical females. In Schœnborn's case the mass of hair weighed 281 grammes. That these cases are not so exceedingly rare is shown by Thornton, who has collected eight recorded cases where post-mortem examination revealed that the presence of hair in the stomach produced death without a correct diagnosis having been made or surgical relief attempted.

Malignant Disease of Œsophagus.—The results obtained by gastrotomy for the purpose of prolonging life in cases of carcinomatous stenosis of the œsophagus are not such as to entitle the operation to the dignity of a justifiable procedure, and yet it must be a source of comfort to the surgeons who continue to perform it to know that the mortality which attends it has greatly decreased since the antiseptic treatment of wounds has been introduced. Zesas, for instance, has collected all cases of gastrotomy before and since the antiseptic treatment of wounds was practised. During the preantiseptic period, thirty-one operations were performed, with the result that only in one case was life prolonged by the operation (Jones).

Of 131 cases operated upon under antiseptic precautions, 28 terminated favorably as far as the operation was concerned. In 104 cases carcinoma of the œsophagus furnished the indication for the opera-

tion, of which only 17 recovered from the immediate effects of the operation. With such a fearful mortality, it becomes a serious question whether the operation is ever justified under the circumstances. Zesas, as the result of his investigations, advises that the operation should be performed early, before the patient has been prostrated from the effects of the disease. It behooves the conscientious surgeon to ask himself the question: Am I justified in submitting a patient suffering from an incurable affection to an operation of such gravity, which at best can prolong life only for a short time? Science, statistics and humanity answer with a positive and unqualified "No."

2. *Non-Malignant Stricture of Oesophagus.*—In non-malignant stricture of the oesophagus, not amenable to more conservative treatment, gastrotomy should be performed, with a view of securing a new inlet for food into the stomach, and for the purpose of affording a more direct route of treating the stricture. So far, the operation has been performed by Caponotto, Fagan, Schede, Cérenville, MacNamara, Davies-Colley, and Bryant. Fagan's two cases died. In Schede's and Cérenville's cases, the principal and direct object of the operation—dilatation of the stricture—was not realized. The same applies to MacNamara's case. Davies-Colley's and Bryant's cases were successful in every respect, as the dilatation of the stricture was accomplished and the permeability of the oesophagus was restored, so as to warrant the closure of the fistula.

Caponotto's case deserves special mention, as it illustrates in an admirable manner the indications for the operation, the method of performing it, and its results. The operation was performed at Turin, September 19, 1884. The patient was a boy, five years of age, who had swallowed by mistake sulphuric acid, five months before the operation. Soon after the accident, symptoms of stricture appeared. He

ate and drank with a good appetite, but vomited everything a few minutes after, and in consequence had become greatly emaciated. The finest olive-pointed bougie could not be passed through the stricture. The abdomen was opened at the usual place for a gastrotomy, and the parietal peritoneum united with the skin, and a continued catgut suture that caught only the serous and muscular coat of the stomach, was made to fix the stomach to the wound. An antiseptic dressing was applied. On the fifth day the stomach was opened and food introduced directly into the stomach. The patient improved rapidly. The next step was to dilate the stricture, which was done by combined dilatation by means of sounds introduced both through the stomach and œsophagus. After one month's treatment, the œsophagus was permeable to food, and the opening in the stomach was closed by another operation. Four months subsequently the boy died of tubercular meningitis. The autopsy showed that the stomach was slightly adherent to the abdominal wall at the site of the operation. The stricture had its location about two cm. above the cardiac orifice, as was shown by a white circular cicatrix.

Loreta's method of digital dilatation in non-malignant pyloric strictures is deserving of confidence, and the results so far obtained merit imitation of the procedure.

3. *Cicatricial Stenosis of the Pylorus*.—In the operative treatment of cicatricial stenosis of the pylorus, the surgeon can resort to gastrotomy with subsequent gradual or forcible dilatation of the stricture, pylorotomy, or gastro-enterostomy. According to Zesas, gastrotomy for pyloric stenosis has been performed twenty-seven times with eleven recoveries. In these cases, the object of the operation is limited to the direct treatment of the stricture through the gastric wound or fistula. If, after opening the stomach, the stricture can be efficiently overcome by rapid digital

dilatation, the visceral and abdominal wounds can be closed. If, however, this object is not obtained, a permanent gastric fistula must be established for subsequent gradual dilatation, until the permeability of the organ has been restored, when the fistula is closed by another operation. It is only proper to remark that the operative treatment of cicatricial pyloric stenosis should be limited to extreme cases of narrow strictures with great dilatation of the stomach, where simpler measures, as a carefully regulated diet, irrigation of the stomach, etc., have proved ineffective in affording relief and maintaining nutrition.

IX. *Pylorectomy*.—It is only a few years ago since Billroth announced to the world the feasibility of partial excision of the stomach for malignant disease by a successful operation upon a human being. The members of the medical profession throughout the entire civilized world were unanimous in their admiration of the man who had achieved what appeared to be the greatest triumph of modern surgery. The method of operating was modified and improved by other operators, and in a short time the medical journals teemed with accounts of new cases from different sources. At the present time we are in a position to decide upon the *justifiability* of the operation. In studying the statistics of the cases so far reported, even the most enthusiastic advocate of the operation must feel that the expectations which had been anticipated have not been realized. The science and art of surgery have both been enriched through the labors of many a bold and enthusiastic operator who have demonstrated the feasibility of pylorectomy, but the results obtained must also satisfy every conscientious surgeon that the time has come when the operation should be at least temporarily abandoned until improved methods of diagnosis will enable us to recognize cancer of the stomach early enough to be amenable to surgical treatment.

1. *Malignant Disease*.—Fourteen cases of pylo-

rectomy for cancer operated upon by Billroth were analyzed by von Hacker as to the pathological conditions and the results which were obtained. He divided them into three classes: 1. No adhesions, disease limited to the coats of the stomach. 2. Slight adhesions which were readily separated. 3. Extensive adhesions and metastatic tumors in adjacent organs. Only two of the patients belonged to the first class; one remained well one and three-fourths of a year and the other three and one-half years after the operation. In the latter case a tumor returned in the abdominal wall and another in the inguinal region which were removed. The second class embraced seven cases; three died soon after the operation; of the remaining four three died four, ten and twelve months after operation from return of the disease; the fourth suffered from return of the disease six months after operation. The five cases represented by the third class died from the immediate effects of the operation. It can be therefore seen that a favorable result can only be hoped for in cases coming within the limitation of the first class where the disease is circumscribed and has not passed beyond the limits of the stomach. Every one must admit the difficulties which surround the diagnosis at this early stage of the disease, and the unwillingness of the patient to submit to such a grave operation when he is comparatively free from suffering, elements which in accordance with Billroth's own experience would limit operations to exceptional cases. Such statistics in the practice of the most eminent surgeon should definitely settle the question in the mind of any surgeon whose humanity has not succumbed to his morbid desire for transient fame.

Statistics from other sources can show no better results. In sixty-one cases of pylorectomy collected by Dr. Winslow, of Baltimore, 50 per cent. have died of shock within twenty-six hours, and of the cases which have recovered not one has lived for

three years without recurrence of the disease at the site of the operation. Kramer has collected eighty-two pylorectomies with sixty-one deaths. In seventy-two cases the operation was done for carcinoma; fifty-five died soon after the operation, of the remaining seventeen only one proved a complete success. It is a source of congratulation to the surgeons of this country that the statistics above quoted are made up almost exclusively of foreign material. While the American surgeon is anxious and ready to adopt all modern innovations and improvements, in this particular instance he has shown a degree of conservatism worthy of his reputation in that direction. When the time has arrived when we shall be able to make an early positive diagnosis of malignant disease of the stomach, pylorectomy will be resuscitated and will find a ready adoption and a hearty welcome on American soil.

2. *Ulcer of the Stomach.*—Rydygier was the first to apply pylorectomy to the treatment of gastric ulcer. He excised a simple ulcer of the pyloric extremity of the stomach with a portion of the head of the pancreas, which was intimately adherent to the posterior surface of the stomach. The ulcer had given rise to stenosis and dilatation of the stomach for which the operation was undertaken. He affirms that resection of a portion of the stomach is a justifiable procedure in arresting hæmorrhage from a perforating ulcer of this organ. Czerny treated successfully a case of perforating ulcer of the stomach by making an incision through the anterior wall through which the ulcer was made accessible to direct operative treatment. The ulcer was excised and the visceral wounds closed. Recovery was complete and permanent. According to the statistics of Kramer pylorectomy has been performed ten times for contracting ulcer of the stomach with four recoveries and six deaths. Cicatricial contraction at the site of operation necessitated a second operation in one case in less than

a year after the excision. The danger of secondary cicatricial stenosis would rather tend to indicate the superiority of gastro-enterostomy as a primary operation in these cases, and more particularly so if the ulcer or cicatrix is situated in the narrowest portion of the stomach, the pyloric orifice.

X. *Gastro-enterostomy*.—This operation was devised by Wölfler as a substitute for pylorectomy in that class of cases where after an exploratory incision it is found impossible to extirpate the diseased pylorus. The operation is performed with a view to re-establish the permeability of the digestive tract by securing a new outlet to the stomach through the medium of a fistulous communication between it and an adjacent loop of the duodenum or upper portion of the jejunum. An incision is made through the anterior wall of the stomach, the margins of which are accurately stitched to a corresponding incision in the intestine by two rows of sutures applied in the same manner as in cases of enterectomy. As compared with pylorectomy this operation is easier of execution, affords a wider range of application, and implies the infliction of less traumatism; while, on the other hand, it has the disadvantage that the pathological conditions which necessitated the operation are left unchanged.

1. *Malignant disease*.—The mortality following this operation is much less than after pylorectomy. According to von Haeker, Billroth has performed gastroenterostomy nine times in cases of cancer of the pylorus where extirpation could not be practised; of this number five died from the immediate effects of the operation, and four survived the operation and were improved for a short time. Kramer gives an account of sixteen gastroenterostomies for malignant disease of the stomach with ten deaths soon after the operation; one patient died four weeks after from the effects of secondary tumors; the remaining five cases lived for several months. In one case Billroth

performed pylorectomy and gastroenterostomy simultaneously upon the same patient. After the excision of the pylorus the end of the intestines and stomach were closed with sutures and a new outlet for the stomach was established by gastroenterostomy. The patient was doing well five weeks after the operation. From the above accounts of the operation it will be seen that for malignant disease of the stomach it has been resorted to only in those grave and desperate cases where excision was found impossible, hence we cannot speak of permanent results, and although the mortality is less than after pylorectomy, it is questionable if the best results that can be obtained by it—a few weeks or months of alleviation—will compensate for the immediate risks of life incident to the procedure.

2. *Non-malignant stricture of the pylorus.*—The future will probably assign the proper sphere of gastroenterostomy to the treatment of grave cases of non-malignant pyloric stenosis. The exclusion of a short space of intestine from the digestive tract by the establishment of a new pylorus by gastroenterostomy will not interfere with the proper maintenance of health, hence the operation in these cases must be looked upon not only as a palliative but also as a curative measure. The results obtained in this class of cases are indeed encouraging. Kramer has collected four cases, of which three recovered. In one of Rydygier's cases, a man 20 years of age, the diagnosis was made of *ulcus pylori* with cicatricial stenosis. When the abdomen was opened the stomach was found enormously dilated. Nothing further was done; the abdominal incision was closed. As the sufferings of the patient continued he begged that another operation should be performed. The abdomen was opened again and a communication between the stomach and duodenum was established by Wölfler's operation, and at the time the case was reported the patient was doing well. From the results already

obtained it must be conceded that gastroenterostomy should be recognized as an established and legitimate operation in the surgical treatment of non-malignant pyloric stenosis.

XI. *Duodenostomy*.—This operation was devised by Langenbuch in 1880 for cases of inoperable stenosis of the pylorus. As the name indicates, it consists in the formation of an external permanent duodenal fistula for the purpose of introducing food directly into the intestinal canal. It was intended for cases where the general debility of the patient would preclude the propriety of the more grave operation of pylorotomy. The operation has been performed by Southam and Robertson, but both patients died on the day of operation. It is not probable that the operation will be again repeated.

XII. *Jejunostomy*.—In view of the great mortality of pylorotomy and gastroenterostomy for malignant disease, Pearce Gould planned and executed the operation known as jejunostomy. The object for which the operation is performed is the same as in duodenostomy, only that the intestinal fistula is made in a lower portion of the intestinal tract at a point where the mesentery is of sufficient length to permit the bowel to be easily drawn forward and stitched to the wound. The patient was 43 years of age, whose vital powers were near to fatal exhaustion. An incision was made in the median line from an inch below the xiphoid cartilage to within an inch of the umbilicus. The disease was found to implicate the pyloric end of the stomach, the commencement of the duodenum and mesenteric glands. The great omentum was pushed upwards and the upper end of the jejunum was drawn forward and stitched to the margin of the wound with a double row of silk sutures. The remaining portion of the wound was closed in the usual manner. The patient was nourished by rectal enemata and Slinger's nutrient suppositories. On the second day a small incision was

made into the bowel through which an ounce each of cream and peptonized beef-tea was injected. The patient continued very restless and became worse and died of exhaustion sixty-six hours after the operation. The autopsy showed that the intestine had formed firm adhesions to the wound throughout and that no inflammation had followed the operation.

From the experience furnished by this case he believes an incision through the left linea semilunaris would be preferable to the median incision. The sutures should be so placed that the part of the intestine presenting in the wound is that portion exactly opposite the mesentery. The opening in the bowel should be across the axis of the intestine, and only long enough to admit the nozzle of a syringe. The food should be administered through the fistula in only small quantities at a time and gradually increased. When larger quantities are injected they should be given very slowly, so as to allow of their being mixed with the biliary, pancreatic, and intestinal secretions, and to prevent distension of the bowel. The food should be fluid and acid in reaction, the best articles being cream and peptonized milk and beef-tea.

Golding Bird performed a similar operation for the same indications some two months later without being aware of Gould's operation. The bowel was opened on the third day, when food was administered solely through the fistula. When the meal exceeded ten ounces it produced indigestion; in smaller quantities digestion and absorption appeared to be performed in a satisfactory manner. The patient improved considerably in health until the ninth day, when through an error of feeding him some food passed into the abdominal cavity, and he died in twelve hours. The reporter pointed out that by this operation duodenal digestion could be assured, and there was, for physical reasons, less chance of regurgitation than after gastrotomy, and that the procedure

required less interference, in its performance, with other viscera than gastroenterostomy.

Interesting as these operations may be from a surgical and physiological standpoint, it is to be hoped that in the future their application will be limited to experiments on the lower animals. I have alluded to the different forms of "ostomies" for malignant disease to show how extensively the principles of abdominal surgery have been applied in laudable attempts to afford relief after the disease had passed beyond the reach of radical measures. As a matter of course the results have been so unsatisfactory that future attempts in the same direction should be abandoned as incompatible with the true aim and advancement of abdominal surgery.

XIII. *Splenectomy*.—Accumulated experience appears to have definitely settled the indications for this operation. As the result of a study of thirty cases of splenectomy, Credé has come to the following conclusions:

1. Adults tolerate removal of spleen without permanent ill results.
2. Extirpation of the spleen produces a temporary disturbance in blood production.
3. The diminution in blood production is corrected by a vicarious action of other blood-producing organs, the thyroid gland and the medullary tissue in bone.
4. The physiological function of the spleen consists in effecting a transformation of the white into red blood-corpuscles.

During the past year a new case of splenectomy for leukæmia has been reported by Rydygier. The extirpated organ weighed six pounds. The patient, a woman 31 years of age, died on the following day of hæmorrhage from the abdominal wound. The ligature on the main blood-vessels involved held perfectly, and Rydygier ascribed the hæmorrhage to imperfect coagulation dependent upon the altered condition of the blood. This case brings the total number of deaths from the operation up to eighteen,

of which sixteen were of hæmorrhage and two from shock. Thus far the only successful case of splenectomy for leukæmia is that performed by Franzolini.

As the pathology of splenic leukæmia remains to be explained and the mortality after extirpation has been so fearful, it would appear almost criminal to increase the sad statistics by adding new cases to the number of failures.

Splenectomy for visceral injury of the organ can show a splendid record, as of twenty cases collected by Zesas of partial or complete removal of a pro-lapsed spleen all recovered.

Credé extirpated the spleen successfully for cystic disease. The incision was made along the outer margin of the rectus muscle on the left side, from the costal arch to the crista ilii. The pedicle was ligated and the stump dropped into the abdominal cavity. The patient, a female, became more and more anæmic for a number of weeks. Four weeks after the operation the thyroid gland became swollen and tender. The gland returned to its normal condition with the general improvement of the patient a few weeks later. Five years after the operation Credé reported his patient as remaining well. The temporary change in the blood had passed away and no abnormal tumefaction of any of the blood-producing organs could be found.

Billroth extirpated a sarcomatous spleen with four ctm. of the tail of the pancreas in a woman 43 years of age who had noticed the tumor for seven years. The growth had been rapid for the last two years. The tumor was firmly adherent to the omentum, small intestines and pancreas; the latter organ was divided with Paquelin's cautery. The operation was not followed by any serious symptoms. During the third week a microscopical examination of the blood showed a slight increase of the white blood-corpuscles. The patient was feeling well four weeks after the operation. The numerous extirpations of the

spleen made by Zesas on animals have demonstrated that it is not an essential organ and that its physiological function in the production of blood-corpuscles is adequately performed by vicarious organs, so that we can safely include splenectomy for visceral injuries and local diseases of the spleen among the well established legitimate surgical procedures.

XIV. *Surgery of the Gall-Bladder*.—Recently the gall-bladder has been made a favorite object of operative treatment. As patients suffering from affections of this organ usually come under the treatment of the physician at first, a brief consideration of the improvements in the surgical treatment of affections of this organ will be of great interest to every physician. It requires no argument to show that surgical treatment should not be resorted to as an *ultimum refugium*, but to secure a good result the operation when required should be done before the patient's strength is too much reduced. An early operation is the more justifiable as statistics have shown that operations upon the gall-bladder are among the safest and most satisfactory within the domain of abdominal surgery.

Although the feasibility of the surgical treatment of affections of the gall-bladder was indicated by J. L. Petit and Thudichum, it was applied in practice almost simultaneously by Sims and Kocher in 1878. Sims completed the operation at one sitting; the patient died on the eighth day. Kocher made a preliminary operation by stitching the gall-bladder to the margins of the wound so as to secure adhesions between it and the peritoneum before resorting to incision and drainage. The patient recovered. In the absence of positive signs and symptoms, indicative of biliary obstruction, it is exceedingly important to resort to a most careful examination in determining the existence of an over-distended gall-bladder. The anatomical location of the tumor, its relation to surrounding organs, and its connection with the under-

surface of the liver are important elements in the differential diagnosis. Mr. Taylor, of Birmingham, who has had ample opportunity to examine cases of enlargement of the gall-bladder with Mr. Tait, describes a diagnostic line which appears to be of great value in determining the existence or absence of a distended gall-bladder. "This line is to be traced from the normal position of the larger end of the gall-bladder near the tip of the cartilage of the 10th rib on the right side, to the opposite side of the abdomen, crossing the middle line slightly below the umbilicus. In the direction of this line a distended gall-bladder will naturally lie." In view of the comparative safety of an exploratory operation this should be preferred to the more doubtful expedients of exploratory puncture and sounding of the gall-bladder, in all cases where a positive diagnosis cannot be made without resorting to these latter diagnostic measures, which cannot be said to be free from danger or to furnish sufficient information upon which to base a positive diagnosis.

The surgical treatment of the diseases of the gall-bladder at present includes three distinct and well-defined methods of operation, viz :

1. Cholecystotomy with or without the formation of an external biliary fistula.
2. Cholecystectomy or excision of the gall-bladder.
3. Duodeno-cholecystotomy or the formation of a new communication between the gall-bladder and the duodenum.

1. *Cholecystotomy*.—At the present time the majority of operators are in favor of finishing the operation at one sitting. According to Keen the incision should be made, as a rule, over the centre of the tumor and parallel to the costal arch. It should be at least three inches in length and enlarged, if need be, afterward. All hæmorrhage must be carefully arrested before opening the peritoneum. Through this opening the gall-bladder and common duct are explored by the

introduction of two fingers, or if necessary, the whole hand to ascertain the condition of the swelling, its relations to surrounding organs, and so far as possible, the character of its contents. If a calculus is found in the common duct an attempt should be made to push it into the duodenum; if this cannot be accomplished it should be forced back into the gall-bladder. If no stone is found present, a distended gall-bladder alone is a sufficient indication for incision and drainage. The evacuation of the gall-bladder is done by aspiration and its wall is subsequently cut to the extent of an inch or more. After incision care must be exercised to prevent escape of bile into the peritoneal cavity. The margins of the visceral wound are carefully stitched to the abdominal wound and the cavity of the gall-bladder, and its duct emptied of their contents.

Immediate closure of the gall-bladder after removal of its contents, was first suggested by Spencer Wells as appropriate in cases where the surgeon can satisfy himself of the patency of the biliary passages. This suggestion was carried out by Mr. Meredith, of London, who closed the incision in the gall-bladder after the extraction of three calculi, by means of a fine silk thread, introduced as a continuous suture, and inverting the edges of the peritoneal coat. The abdominal incision was closed in the usual way; no drainage being employed. This patient died in forty-eight hours with suppression of urine. At the autopsy the incision in the gall-bladder was found securely closed and quite impervious to fluid. He remarks on this method of operating as follows: "As regards the method adopted—of dispensing with drainage—I do not feel inclined to recommend it, although there appears to me no reason why it should not succeed in a favorable case, provided always that it was possible to ascertain that no obstruction remained in the ducts. This, of course, constitutes the chief difficulty, and may be impossible, so that, on

the whole, I believe that the more usual plan of draining the gall bladder-should be preferred, at all events in the majority of instances."

Mr. Tait has expressed a similar opinion on this subject. He states distinctly that it cannot always be ascertained with certainty that the common duct is patent, and if this should not be the case the periodical contractions of the gall-bladder might cause a giving way of the sutures, and extravasation of bile into the periodical cavity. That these fears are not without foundation is well illustrated by the case of cholecystotomy reported by Dr. Parkes. The case reported by Dr. Bernays during the last year on the other hand, demonstrates the advantage of suturing the gall-bladder and dispensing with drainage, as the patient recovered in a remarkably short time without any untoward symptoms and without the inconveniences of a temporary fistula. As in the majority of cases the safety of the patient is enhanced by the formation of an external biliary fistula, which also enables the surgeon subsequently to treat the interior of the gall-bladder and the bile ducts, should this be required it is evident that immediate closure of the gall-bladder has only a limited sphere of usefulness, and is applicable only in exceptional cases where the permeability of the biliary passages can be demonstrated at the time of operation. As in all other abdominal operations, the results obtained by Mr. Tait in the surgical treatment of diseases of the gall-bladder stand unsurpassed and preëminent. He performed cholecystotomy twenty-one times with as many recoveries. From different sources Dr. J. McF. Gaston has collected thirty-three cases of cholecystotomy with a mortality of 27.7 per cent., nine having died.

2. *Cholecystectomy*.—Ligation of the cystic duct and extirpation of the gall-bladder was introduced as a substitute for cholecystotomy by Langenbuch. He claims for his operation that it is not attended by any of the risks incident to incision and evacuation

of the gall-bladder, and that in cases of recoveries from the operation it prevents the possibility of a recurrence of the disease and that the chances of a permanent biliary fistula are never incurred. He has performed the operation five times, with two deaths, one from acute œdema of the brain, and the other from an ulcerous perforation of the cystic duct. Two successful cases are reported by Thiriar and one by Corvoisier.

Mr. Tait prefers cholecystotomy to cholecystectomy, as being an easier and safer operation, and in case a recurrence of the disease makes a second operation necessary, he claims that the first operation makes the second easier. It can be done readily and without any danger through the adherent cicatrix, without any risk of opening the peritoneal cavity.

Duodeno-Cholecystotomy.—This term signifies an operation for uniting the gall-bladder and duodenum, by an opening between them. It has been suggested as a surgical procedure almost simultaneously by Harley and McF. Gaston, in cases of impermeability of the common bile duct, while the cystic duct is permeable, or may be rendered so by surgical means. In regard to such an operation, Harley says: "The triumph of modern surgery would be to establish an artificial fistula between the gall-bladder and the duodenum. For then not alone would the pent up bile be removed, but the disturbances arising from the non-admittance of bile into the intestines would likewise be at the same time overcome. I am not quite sure if, in these days of antiseptic surgery, the operation is not practicable; for I can see no reason why the adjacent surfaces of the gall-bladder and duodenum should not be eroded by potassa fusa and speedily stitched together." Dr. Gaston has made this subject an object of patient and persevering experimentation. In summing up his results he says: "Out of fifteen subjects only three dogs finally survived the primary operation; yet it will be

According
to Gaston

observed that the results of attachment of the gall-bladder to the duodenum and firm union by adhesive inflammation between their surfaces, and the formation of a fistulous opening through this septum, which affords a communication between their cavities."

The *feasibility* of this operation has been demonstrated on animals, but its adoption in practice as a legitimate, justifiable operation can only be expected after a more safe and expedient method of accomplishing the object has been devised, and its applicability has been demonstrated more satisfactorily on animals.

XV. *Injuries and Surgical Affections of the Liver.*—The idea of treating injuries and some of the diseases of the liver by surgical means is not a new one, as Ceccherilli credits his countryman, Zambecari, with having made experiments on animals with such a view as early as 1680. Experiments and clinical observation have shown that injuries of the liver under favorable circumstances are not only repaired, but that in some unaccountable and as yet unexplained manner, loss of substance is replaced by regeneration. Thus Ceccherilli reports, among a number of operations, a very interesting case where he performed excision of a portion of the liver, with the gall-bladder, in a large hunting dog, with Paquelin's cautery. The operation was bloodless, and the animal recovered without any untoward symptom. The animal remained perfectly well, and was killed 226 days after the operation. The autopsy showed a cicatrix in the liver at the site of the operation, and that the organ had been restored to its former shape and size, as was ascertained by comparison with the liver of a dog of the same size. From the results of his experiments he advises that in no case should more than one-third of the size of the liver be excised. To prevent or arrest hæmorrhage he prefers the actual cautery to the elastic ligature and pressure forceps.

1. *Wounds*.—That gunshot wounds of the liver are not necessarily fatal, even if no active surgical treatment is resorted to, has been well established by a number of cases where the bullet was found encysted in the organ, without having given rise to any symptoms during life, years after the injury had been received. Thus Bilguer found a bullet encysted in the liver four months after the accident. Guthrie, Paroisse, and Thompson have each reported a case where, on autopsy, the bullet was found in the gall-bladder, the patient having died with other affections. These cases and the results of experiments are only mentioned with a purpose to show that with proper surgical treatment injuries of the liver would not be attended by such great mortality as has been the case on the expectant plan of treatment. The two great dangers attending visceral injury of the liver are hæmorrhage and extravasation of bile into the peritoneal cavity. In subcutaneous lacerations of the liver, if the symptoms are such as to indicate internal hæmorrhage of a serious nature, the only chance to save life would be to perform abdominal section, and to control the hæmorrhage by direct measures, as without such interference the patient would be almost certain to die of peritonitis, even if he recovered from the effects of hæmorrhage.

From the anatomical structure of the liver it is easy to conceive that the arrest of hæmorrhage from this organ is not an easy task. Ligation is out of question. If the wound has a regular outline and involves the border of the liver accurate coaptation of the wound surfaces with catgut sutures traversing the entire thickness of the organ, would offer a fair chance of controlling the hæmorrhage. The needle should be round and not quite as large as the thread of the catgut, so that the punctures would not give rise to additional sources of hæmorrhage. If the wound is irregular or located in such a manner as to render suturing impossible, the actual cautery can

be used to advantage. If this fails to control the hæmorrhage, we have still left at our disposal one of the most reliable and safest means of arresting parenchymatous or venous hæmorrhage, in the aseptic tampon—a tampon made of iodoform gauze. If an aseptic tampon is to be successful in arresting hæmorrhage, an aseptic condition of the wound is indispensable. In subcutaneous and consequently, aseptic, wounds of the liver rendered accessible to treatment with the tampon by abdominal section, there would be no objection in plugging the wound permanently, closing the abdominal cavity with the exception of an opening for a drainage-tube as near as possible at a point opposite to the visceral wound.

Drainage in these cases is required on account of possible extravasation of bile taking place by filtration through the tampon. In the course of time the aseptic foreign material would become encysted. The use of the tampon for arresting hæmorrhage from the liver was advised by Thesen as early as 1795, and more recently by Brotherson, Demme, and Volkmann. In penetrating wounds of the abdomen with visceral lesion of the liver, the same means may be resorted to in arresting hæmorrhage and guarding against extravasation. In incised wounds suturing, if possible, should be resorted to; in gunshot wounds the aseptic tampon, with drainage is indicated. As prolapsed portions of the liver are also usually contused, reposition, as a rule, is contraindicated, and such portions are better removed with a Paquelin's cautery.

As aseptic foreign bodies may become encysted in the liver as well as in other parts of the body, no additional injury should be inflicted in order to effect their removal. All such attempts are attended by an increase of hæmorrhage and, from the friable nature of the substance of the liver, unless the greatest care is exercised an increase of traumatism is inevitable. On these accounts a faithful effort should be

made to secure an aseptic condition of the wound so as to obtain the most favorable condition for the healing of the wound, and the formation of a capsule around the foreign body in all cases where extraction cannot be readily accomplished.

2. *Abscess and Echinococcus Cysts*.—The treatment of abscess of the liver and echinococcus cysts by abdominal section is based on the same principles which embrace all the precautions which are necessary to obtain adhesion between the parietal and visceral peritoneum at the site of incision. The recognized plan of treatment consists in making an exploratory incision through the abdominal wall over the most prominent part of the swelling, to ascertain the presence or absence of adhesions. If the peritoneal cavity is found obliterated, the operation is finished at once by incising and draining the abscess or cyst. If, on the other hand, no adhesions are found, the surface of the liver is exposed and the wound packed with iodoform gauze and an antiseptic dressing applied, which is allowed to remain for four to five days, until adhesions have formed, when a second operation is made to evacuate the contents of the swelling by incision. If the abscess or cyst is centrally located, and a considerable portion of healthy liver tissue is interposed between it and the external surface of the organ, it is advisable to make the incision with Paquelin's cautery, so as to prevent unnecessary or dangerous loss of blood. Echinococcus cysts are frequently located upon the upper surface of the liver, and on this account are inaccessible to treatment by abdominal section. In such cases the practice of attacking them through an opening in the chest, as has been successfully done by Israel and Volkmann, recommends itself as the safest and most expedient operation.

XVI. *Surgery of the Pancreas*.—The surgery of the pancreas belongs to the future. The physiological function of this organ requires further investiga-

tion for a more intelligible interpretation of symptoms when the seat of injury or disease. The only pathological conditions of the pancreas which have been made an object of surgical treatment are cysts. A number of successful cases of this kind are on record where a permanent cure was obtained by laparo-pancreatotomy, or the formation of an external pancreatic fistula. In only one case did the fistula remain permanently; in all the rest the secretion diminished gradually, and ceased definitely with the healing of the fistula. It is to be hoped that the symptomatology of different lesions of the pancreas will be made a special object of careful study and investigation, so that in the future we may be able to recognize and classify the different diseases of this remote organ during life, so that we may be able to resort to laparotomy in affections which may be amenable to direct surgical treatment.

XVII. *Laparo-nephrectomy*. — Although statistics have shown that lumbar nephrectomy is a much safer operation than laparo-nephrectomy, the latter has a legitimate sphere in cases of large tumors of the kidney, which cannot be removed through a lumbar incision. This operation also enables us to examine the opposite kidney at the time of operation, an advantage which is considered of sufficient importance by Thornton to give this operation the preference in all cases where nephrectomy is intended. Bruntzel has lately removed successfully a fibroma of the capsule with the entire kidney weighing $37\frac{1}{2}$ pounds, by abdominal section, in a woman thirty-three years of age. The tumor had reached this enormous size in five years. It reached from the ensiform cartilage to the symphysis pubis, distending the abdomen equally in all directions. Tympanitic resonance on percussion on both sides of the tumor. Palpation and exploratory puncture showed that the structure of the tumor was firm and solid. An incision was made the entire length of the linea alba. On opening the

abdomen the tumor came into view covered by peritoneum, which was divided over the whole length of the tumor. The tumor was enucleated with the kidney and the pedicle, which was composed of the renal vessels, was tied, and after division dropped into the abdomen. The cavity was drained towards the lumbar region and the divided peritoneum sutured. Notwithstanding that a fecal fistula formed subsequently, the recovery of the patient was complete and permanent.

By a similar operation, Hicquet extirpated successfully a retroperitoneal sarcoma, which was intimately connected with the kidney with the latter organ in a girl six years of age. In this case the renal artery and vein were tied separately. For the extirpation of malignant tumors of the kidney or its immediate vicinity, laparo-nephrectomy affords a better chance for a thorough removal of diseased tissue and for controlling hemorrhage, and on these accounts should be preferred to the lumbar operation. Whenever practicable, the integrity of the peritoneal cavity should be restored by suturing, and, if required, drainage established in the lumbar region.

XVIII. *Laparo-nephrotomy*. — This operation is indicated in all cases of hydro-nephrosis and pyonephrosis, where from the size of the swelling, or on account of adhesions anteriorly lumbar nephrectomy is contraindicated or cannot be performed. It is also preferable to the lumbar operation where a positive diagnosis cannot be made, between disease of the kidney and other fluctuating tumors of the abdomen, and in some instances extirpation of a hydronephrotic or pyonephrotic kidney is contraindicated by a disease of the opposite kidney or the general debility of the patient.

XIX. *Tumors of Omentum Majus*. — Tumors of the large omentum give rise early to pain or a sensation of discomfort, by causing traction upon the transverse colon by their weight. As a rule, tumors

of this structure are found in the umbilical region, and have no connection with adjacent organs, hence they are movable in all directions, except downward. The differential diagnosis between omental and intestinal tumors in the same region rests upon the complexus of symptoms caused by the latter group, from their anatomical location interfering more or less with the functions of the intestinal tract. In the examination of an omental tumor, it must be remembered that it is in immediate contact with the anterior abdominal wall, consequently its presence will be indicated by an area of dulness on percussion corresponding to the size of the tumor. If the area of dulness remains permanent and unchangable, it would be an indication that the tumor has become adherent, or that the tumor is not omental but parietal.

Primary malignant disease of the omentum, if it could be recognized early, would offer most favorable conditions for successful radical extirpation by abdominal section. Cystic tumors and echinococcus cysts are most favorably located for successful treatment by abdominal section and drainage.

XX. *Tumors of Mesentery*.—Aggressive surgery is gradually but surely encroaching upon the most remote tissues within the abdominal cavity, thus extending the benefit to be derived from direct local treatment to the most distant pathological conditions.

A few years ago, M. Tillaux extirpated successfully from the mesentery a glandular tumor which had undergone degenerative changes. The patient was a man, aged thirty-one years, in excellent health, who was taken suddenly ill without apparent cause. The most prominent symptom was a violent pain in the abdomen, which compelled him to remain immovable for about fifteen minutes. The pain recurred after a short interval with unmodified intensity. The following day the suffering continued in spite of anodynes, which were given freely. He was now

removed to the hospital, where on examination a round tumor was found in the abdomen, which was thought to be a floating kidney. The patient suffered with obstinate constipation and pain for twenty-five days, when the pain became paroxysmal and always aggravated when he attempted to take food. He only obtained relief when he sat on his bed bent double, with his head resting on his knees. At this time M. Millard diagnosticated chronic invagination of the intestines. About thirty-eight days from the beginning of the illness, abdominal section was performed by Tillaux. The abdomen was opened sufficiently to permit the introduction of the hand, when he found a round tumor about the size of the head of a foetus at term, situated on the right side of the mesentery which fastened the intestine to the spinal column. The tumor was recognized as a cyst of the mesentery. This was punctured and subsequently incised and evacuated from it caseous matter, resembling thick cream. Catgut ligatures were then thrown around the base of it, tied, and then the whole of the tumor cut off above them. The pedicle was touched with a strong solution of carbolic acid, the organs returned, and the wound closed. The pain ceased promptly and the recovery of the patient was complete. The histological examination of the tumor showed it to be composed of a lymphatic gland containing the products of caseous degeneration. This case illustrates that it is comparatively safe to remove tumors of the mesentery by ligation or enucleation, while, on the other hand, extirpation of tumors requiring for their removal the excision of a corresponding portion of the mesentery is a vastly more serious and difficult operation.

Wölfler reports a case of this kind. In his case a fibroma of the mesentery weighing $1\frac{1}{2}$ pounds was removed with the mesentery and a corresponding portion of the intestine 113 ctm. in length. The ends of the bowel were brought together with sutures.

The patient survived the operation only for twenty-four hours. Wölffler suggests that in the future enterectomy in connection with extirpation of tumors of the mesentery should be followed by enterorrhaphy only in cases where the site of operation involves the movable portion of the bowel, as the cæcum, transverse colon, and sigmoid flexure, while in other localities no attempt should be made to unite the resected bowel, but the efforts of the surgeon should cease with the formation of an artificial anus. That this advice is not tenable in all cases becomes apparent, as, for instance, if the tumor is located in the mesentery of the upper portion of the intestinal canal, the physiological exclusion of such a large intestinal surface would be incompatible with a proper maintenance of digestion, assimilation, and nutrition.

My experience on animals in extirpating the pancreas has satisfied me of the tolerance of the small intestine to even extensive detachment of the mesentery. If it can be accomplished without producing mechanical destruction of the bowel by flexion it would be advantageous to approximate the vascular supply by suturing the mesenteric wound. This course also suggests itself as an important measure in preventing a defect in the mesentery which might subsequently become a source of internal strangulation. Hamerton has collected eight operations done for extirpation of tumors of the mesentery of which only one appears to have recovered. This case was operated upon by Sir Spencer Wells, who removed a tumor the size of an adult head. A microscopic examination showed that the tumor was a spindle-celled sarcoma. In a recent communication in the *London Lancet* Mr. Wells informs us that the patient has remained free from a recurrence of the disease and remains otherwise in good health since the date of operation, June, 1882. In all benign tumors of the mesentery enucleation should be preferred to excision

so as to preserve intact as much as possible of the mesenteric circulation.

There can be no question but that mesenteric detachment is more likely to be followed by gangrene of the bowel if enterectomy is performed than when the continuity of the intestinal tube is preserved.

XXI. *Retro-peritoneal Tumors.*—The extirpation of a retro-peritoneal tumor by laparotomy must be looked upon as one of the most serious and difficult operations in surgery. Aside of the unusual difficulties encountered in arriving at correct conclusions as to the exact seat and nature of tumors in the retro-peritoneal space, the technique for their removal remains to be improved by future research and experimentation.

Dr. Homans has reported two cases of retro-peritoneal tumors removed by abdominal section. In the first case the operation was performed for a myxolipoma in a man 39 years of age; the tumor had been growing for two and a half years. The second patient was a woman 60 years of age, suffering from a lipoma. The tumor was located in both cases in the right side. In the first case another tumor was found in front and toward the left of the spine, which could not be removed. Both patients died soon after the operation.

In the first case the mesentery of the ascending colon was detached to gain access to the tumor. Homans very properly warns against such extensive deprivation of vascular supply to the bowel in this particular locality. He advises, under such circumstances, either enterectomy and enterorrhaphy, or the formation of a preternatural anus. It would seem that in some of these cases, where the tumor is of moderate size, the operation would be easier, and the results better, if a lateral abdominal incision were made without opening the peritoneal cavity. In approaching the tumor through the peritoneal cavity

after dividing the overlying peritoneum, the enucleation of the tumor should be accomplished by the use of blunt instruments, and with special care to preserve the integrity of the mesenteric vessels so as to avoid, if possible, the necessity for enterectomy and enterorrhaphy.

The foregoing fragmentary and imperfect sketch of the Present Status of Abdominal Surgery will, I hope, at least serve the purpose of impressing upon you the importance and magnitude of this, the most recent, department of surgery. I have attempted to allude to the defects as well as the advances, the failures as well as the triumphs. The results already obtained by the surgical treatment of injuries and diseases of the abdominal organs, are indeed gratifying, and bear abundant evidence of the good and faithful work which has been accomplished. The greatest achievements of abdominal surgery, however, necessarily belong to the future. This new territory, only so recently acquired by the surgeon, has been only partially explored. New operations will be devised and old ones improved. Diagnosis will be made more certain by a careful study of symptoms, a more thorough knowledge of physiology and pathology of the abdominal organs. Experimental research will clear up many obscure points in the causation of disease, which will lead to new and improved methods of treatment. With all these prospects before us, let us not remain idle. Abdominal surgery is of American birth. Let us cherish our own offspring. The world holds us responsible for its healthy growth and development. McDowell, Gross, Sims, the distinguished fathers of Abdominal Surgery, have left us in charge of an important and sacred trust. Let us labor in this department honestly, unceasingly, zealously, as faithful guardians of the promising infant until it shall have attained vigorous, perfect manhood, a source of pride

to its illustrious parents, a perpetual fountain of blessing to suffering humanity, and a priceless honor to American Surgery.

